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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,984	08/16/2004	Shekhar Bhansali	1372.187.PRC	9395
21901	7590	11/16/2006	EXAMINER	
SMITH HOPEN, PA 180 PINE AVENUE NORTH OLDSMAR, FL 34677			ALANKO, ANITA KAREN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/710,984

Applicant(s)

BHANSALI ET AL.

Examiner

Anita K. Alanko

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 8/21/06 amdt.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 4-15 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1 and 4-15 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 21 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

***Drawings***

The drawings were received on 8/21/06. These drawings are acceptable.

***Specification***

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the specification lacks explicit basis for using ethanol in step (g), as in new claim 15. The specification has basis for HF, but does not describe the use of ethanol.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 15 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification lacks explicit basis for using ethanol in step (g), as cited in claim 15. The specification has basis for HF, but does not describe the use of ethanol.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-7, 9, 11-12 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Ishida et al (US 5,830,777).

Ishida discloses a method comprising the steps of:

providing a silicon wafer 2;

diffusing the wafer with dopant (to form p+ region 3, Fig.5), whereby the diffusion creates a PN-junction throughout the surface of the wafer (forming n-type layer 5, Fig.6);

providing a mask 20a (Fig.5);

positioning the mask 20a in overlying relation to the surface of the wafer;

patterning a layer of oxide 22 on the surface of the wafer (with openings 22a, Fig.7);

etching the wafer to create recessed areas 4 coincident with the patterned oxide (Fig.10), whereby the etching step is sufficient to etch away the surface PN-junction created by the diffusion step, thereby creating recessed areas characterized by the absence of surface PN-junction (hollow regions defined by/coincident with where openings 22a are -see Fig.7, the “absence” is the hollow region – since no surface material is there, surface junction is also not present);

hydrofluoric acid etching the wafer to form porous silicon 24 thereon, whereby the porous silicon is formed coincident with the surface area characterized by the absence of surface PN-junction (since the porous silicon is defined in part by the region 23);

subjecting the wafer surface to wet etching resulting in dissolution of the porous silicon (Fig.10).

Note that the claims are not limited to a particular order of steps.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8, 10, 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida et al (US 5,830,777).

The discussion of Ishida from above is repeated here.

As to claim 8, Ishida does not disclose how the oxide layer is formed. It would have been obvious to one with ordinary skill in the art to deposit the oxide by sputtering because it is a conventional, useful technique for oxide deposition.

As to claims 10 and 13-14, Ishida does not disclose how long the etching is conducted. The time depends on the desired effect- how much material is to be removed, how fast it should be removed, the temperature of the etchant. For example, the temperature of the etchant affects how quickly the etching is conducted. It would have been obvious to one with ordinary skill in the art to use the cited time in the method of Ishida because the time appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

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***Response to Amendment***

The objection to the drawings and rejection under 35 USC 112, 2<sup>nd</sup> paragraph are withdrawn. Applicant's arguments and claim amendment are persuasive that removing a surface region is sufficient to create recessed areas characterized by the absence of surface PN-junction. The claims remain rejected over Ishida. New claim 15 is rejected under 35 USC 112, 1<sup>st</sup> paragraph and the specification is objected to as lacking proper antecedent basis for the claim 15 terminology of the use of ethanol during the HF etching step.

***Response to Arguments***

Applicant's arguments filed 8/21/06 have been fully considered but they are not persuasive.

Applicant argues that Ishida does not disclose the order cited in the claim. In response, the claims are not limited to a particular order, and therefore the argument is not commensurate in scope with the claim language. Merely inserting a, b, c in the claims do not introduce an order. One way to limit the claims to a particular order is to explicitly state in the preamble "comprising the steps in the following order." Examiner wishes to note that steps (c) and (d) are meaningless since none of the other steps relate to them. The mask is never used.

Applicant argues that Ishida does not etch the wafer to create recessed areas coincident with the patterned oxide. In response, since the claims have open comprising language and are not limited to any particular order, the recessed areas include the etching of porous silicon regions to form recesses 4. The regions are coincident with the patterned oxide since they are defined by the patterned oxide. "Coincident" is a broad term, and if applicant is arguing that the

openings of Ishida are of a different shape than the instant invention, the argument is not commensurate in scope with the claim language.

Applicant argues that Ishida does not describe forming porous silicon in a surface area characterized by the absence of a surface PN-junction. In response, since the recess is hollow, there is no material there, and thus there is an “absence” of a surface PN-junction.

Examiner repeats the arguments from the previous office action.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

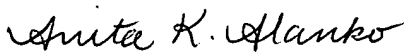
Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Anita K Alanko  
Primary Examiner  
Art Unit 1765